

## **Value Engineering**

Effective: October 15, 1997

## **UDOT 08A4-1**

Revised: August 3, 1998

### **Purpose**

To establish the procedure for selecting, studying and reporting on Value Engineering (VE) projects.

### **Policy**

The Department will establish and maintain a program utilizing the Value Engineering (VE) discipline on selected projects, items, procedures, and processes to reduce cost, improve performance, and increase productivity. VE techniques can be used to improve productivity or the benefit to cost ratio and life-cycle cost savings in nearly every aspect of the state's transportation program, including Preliminary Engineering, Traffic Operations, Construction, Maintenance, Standard Drawings and Specifications, and Design Criteria and Guidelines. The Federal Highway Administration encourages and supports the State to utilize the VE process throughout highway project development, construction, operation, and maintenance, as evidenced by FHPM No. 6-1-1-9. The American Association of State Highway and Transportation Officials (AASHTO) also endorses the concepts of Value Engineering in its "Guidelines for Value Engineering."

VE objectives will be achieved by following the guidelines set forth in UDOT 08A4-1.1 through 08A4-1.6 and in the Value Engineering Manual of Instruction.

The associated procedures are set up by phase:

Preconstruction Phase	UDOT 08A4-1.1
Construction Phase	UDOT 08A4-1.2
Training Phase	UDOT 08A4-1.3
Maintenance Phase	UDOT 08A4-1.4
Standards Phase	UDOT 08A4-1.5
Post-Construction Phase	UDOT 08A4-1.6

# Procedures

## Preconstruction Phase

UDOT 08A4-1.1

**Responsibility:** Division Director of Roadway Design Support, Region Preconstruction Engineer or Value Engineer and Project Manager.

## Actions

1. Select projects at the Concept phase that appear to be good candidates for a VE Study. The Concept Report should indicate that a VE Study should be considered. A VE Study should be considered for major projects with significant potential for savings or improvements in project effectiveness. Some typical characteristics of potential VE projects are:
  - a) projects that substantially exceed initial cost estimates;
  - b) items that have questionable function or are complex and provide unique but costly functions;
  - c) large structures;
  - d) items using critical or expensive materials;
  - e) items requiring difficult construction or fabrication procedures;
  - f) items that are the result of custom, tradition or opinion;
  - g) items that appear to be too costly to build or maintain;
  - h) projects having accelerated design times;
  - i) designs that have grown too complex by being added to over a long period of time;
  - j) consultant design projects;
  - k) any project over \$25 million.

**Responsibility:** Value Engineer, Project Manager

2. Establish VE Teams. Proper selection of team members is very important to the success of the VE study. The Project Manager should review potential team members and select persons in such a makeup that complies with these requirements and lends to a creative atmosphere. Value Engineering team structure is governed by the following:
  - a) Multi-disciplined - a basic concept of value engineering requires that teams be multi-disciplined. Teams should be structured so there is appropriate expertise to evaluate the major areas anticipated within the project. In no case should a majority of the team represent one area of expertise.
  - b) Team Size - VE teams shall normally consist of not less than five nor more than eight members, including the team leader. Project Manager, Project Design Engineer, Consultant Manager, or other persons directly responsible for the planning or design generally shouldn't be team members, but are expected to participate as an information source. Team members that have not received formal VE training may be allowed; however, there should be no more than two untrained members participating on any one team.
  - c) Maintenance, Construction and Design representation - Each VE study team should consist of representation from maintenance, construction, and design offices from within the Region where the project resides.
  - d) Project Specific - In the event of specialized projects, persons with specific expertise necessary to perform a proficient VE review should be included in the team makeup. If necessary, the Value Engineer should obtain the services of qualified experts from private consultants or contractors as team members.
  - e) Team Leaders - Each VE study team shall have a team leader appointed by the Project Manager. The Team Leader shall have the responsibility for conducting the project review in accordance with these procedures. Team Leaders must have served on at least two team studies as a member and have attended a forty-hour VE workshop.
  - f) Team Independence - The VE team shall be independent of other design review processes.
3. Notify team members and responsible designer of the date selected, location and expected length of study at least one month in advance.

4. The value engineering process has a nine phase value engineering job plan. The phases are:
  - a) Selection
  - b) Investigation
  - c) Analysis
  - d) Speculation
  - e) Evaluation
  - f) Development
  - g) Presentation
  - h) Implementation
  - i) Program Review

The VE study will be conducted in accordance with the methods outlined in the Utah Department of Transportation's Value Engineering Manual of Instruction. The Project Manager is responsible for VE job phases a,h,i, while the VE teams shall perform tasks in phases b through g.

5. The VE review will be conducted as indicated in the policy UDOT 08-1 (Design Process).

**Responsibility:** Division Director of Roadway Design Support or Region Preconstruction Engineer

6. Compile and supply all required project data to Team Leader. This data will include the Concept Report, Plan Sheets (including typicals and traffic control sheets), environmental documents, cross-sections, profiles, Structure Situation & Lay-out, aerial photographs (if available), traffic projections and a detailed estimate.

**Responsibility:** Value Engineer Consultant and VE Team

7. Conduct VE Study.
8. Prepare presentation of VE Team recommendations for those responsible for design of project (Region Preconstruction Engineer or Division Director of Roadway Design Support).

9. Prepare summary of VE Team recommendations and make presentation to Project Manager, Preconstruction Engineer, and Region Director.
10. Distribute summary to responsible design party and Engineer for Pre-construction.

**Responsibility:** Division Director of Roadway Design Support or Region Preconstruction Engineer

11. Review the VE Team recommendations and adopt those that benefit the total project.
12. Submit memo within 30 days of study to Value Analysis Engineer stating which VE recommendations were adopted and why the others were not adopted.

**Responsibility:** Engineer Consultant, Value Engineer

13. Prepare final report concerning the VE Study results.
14. Complete annual FHWA Value Engineering Summary Report.

**Responsibility:** Region Construction Engineer

**Actions**

1. Evaluate and process all Cost Reduction Proposals in accordance with Utah Standard Specification 104.07, "Value Engineering." Consult with Value Analysis Engineer on any questions.
2. Maintain a listing of all approved cost reduction proposals.
3. Report all approved cost reduction proposals to the Value Analysis Engineer in August of each year.

**Responsibility:** Value Engineer

4. Prepare final and annual VE reports for FHWA.

## **Training Phase**

**UDOT 08A4-1.3**

**Responsibility:** Value Engineer

### **Actions**

1. In conjunction with the Training Section schedule and arrange 40 hour FHWA VE workshops for UDOT employees as funding permits.
2. Conduct 1 ½ day workshops for UDOT employees using previously completed VE studies.
3. Keep current roster of UDOT employees that have had formal VE training and the extent of that training.

## Maintenance Phase

## UDOT 08A4-1.4

**Responsibility:** Region Maintenance Engineer, Engineer for Maintenance or Standards Committee member

### Actions

1. Submit item (procedure, equipment use, materials, etc.) on which a Value Engineering Study is requested to the Value Analysis Engineer.

**Responsibility:** Standards Committee or Value Engineer

2. Select whether a team study, no study, or an individual study by the Value Analysis Engineer is most appropriate.

**Responsibility:** Value Engineer

3. Conduct VE team study or individual study as recommended by Standards Committee.
4. Prepare summary of VE study recommendations for original proposing party.

**Responsibility:** Engineer for Maintenance or Region Maintenance Engineer

5. Review VE Study recommendations and adopt those that benefit the Department.

**Responsibility:** Value Engineer

6. Prepare final report concerning VE Study results.



**Responsibility:** Standards Committee

**Actions**

1. Submit Standard Drawings, Standard Specifications, Supplemental Specifications, or Special Provisions that may benefit from a VE Study to the Value Analysis Engineer.

**Responsibility:** Value Engineer

2. Establish VE team.
3. Notify team members and conduct a team VE Study as in the preconstruction phase.
4. Prepare summary of VE Team recommendations for Engineer of Standards and Review.

**Responsibility:** Standards Committee

5. Review VE Team recommendations and adopt those that benefit the Department.

**Responsibility:** Value Engineer

6. Prepare final report concerning VE Study results.
7. Complete annual FHWA Value Engineering Summary Report.

**Responsibility:** Standards Committee Member or Region Construction Engineer

**Actions**

1. Recommend recently completed construction projects as candidates for a “Design and Operations Review” (D&OR)

**Responsibility:** Value Engineer

2. Select and schedule projects to be reviewed.
3. Select team to be involved on review including a core of three permanent members: appointees from the Safety and Maintenance Divisions and the Value Analysis Engineer.
4. Notify team members of time and location of study.
5. Assemble data required for study.

**Responsibility:** Design and Operations Review Team (D&OR)

6. Attend project orientation and document overview meeting.
7. Perform on-site study.
8. Prepare draft summary of study observations and conclusions. This report will include recommendations for the continuance of good aspects and possible changes for poor features noted in the study.
9. Distribute draft report to division head of affected area (i.e.; Engineer for Preconstruction on design aspects, Engineer for Construction on Construction procedures, Engineer of Standards and Review on Standard Specifications or drawings, etc.) for review.

**Responsibility:** Division Head

10. Review and comment on draft study report.

**Responsibility:** D&OR Team Permanent Members

12. Prepare final study report.
13. Distribute report to necessary divisions for implementation.
14. Prepare annual report summarizing teams findings for the year.